

Lecture Notes on

**MONEY, BANKING,
AND FINANCIAL MARKETS**

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Chapter 15b: A Simple Model of Multiple Deposit Creation

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Now that we've seen how bank deposits account for a large fraction—almost one-half—of the total money supply, and now that we've been introduced to the four major players in the money supply process, including the most important player, the Federal Reserve System, we can begin to think more specifically about the money supply process.

At the heart of the money supply process is a more basic process of multiple deposit creation. Thus, to begin our analysis, we need to know more about what this idea of multiple deposit creation is and more about how it works.

We'll start by looking at two ways in which the Fed provides additional reserves to the banking system: by making discount loans and by conducting open market operations.

Then we'll see how the process of deposit creation works, first at the level of a single bank and then at the level of the banking system as a whole.

Finally, we'll take note of some shortcomings of our model and suggest ways in which we can modify or extend our analysis to make it more realistic.

1 Multiple Deposit Creation

In our introduction to the money supply process, we saw how bank deposits account for almost one-half of the total money supply, as measured by the Federal Reserve's M1 monetary aggregate.

That means that to understand the money supply process, we need to begin by understanding the process through which deposits are created.

And to do so, we'll focus our attention at first on two of the four main players in the money supply process: the Federal Reserve and banks.

Let's begin with the Fed. When we examined the Fed's balance sheet, one of the items we saw listed on the liability side was reserves.

As it turns out, whenever the Fed supplies the banking system with an additional dollar in reserves, deposits increase by more than one dollar—that is, by a multiple of one dollar. The process through which this happens is the process of multiple deposit creation:

Multiple Deposit Creation = When the Fed supplies the banking system with an additional \$1 in reserves, deposits increase by more than (a multiple of) \$1.

Our simple model of multiple deposit creation will show us exactly how this process works.

But what makes this a “simple” model of multiple deposit creation?

This will be a simplified model because it makes two special assumptions:

1. It assumes that banks never hold excess reserves.
2. It assumes that individuals and non-bank corporations never hold currency.

Neither of these assumptions is very realistic.

Of course, banks hold excess reserves. And as we say in our analysis of bank management, they have good reason for doing so. Holding excess reserves allows each individual bank to cope with deposit outflows.

And of course, individuals and non-bank corporations hold currency to make some of their transactions.

But these two assumptions will make our analysis cleaner and easier to understand at first. So let's keep them for now, and see where they lead us.

2 How the Fed Provides

Recall that the main idea behind multiple deposit creation is that when the Fed supplies an additional \$1 in reserves, deposits increase by a multiple of \$1.

But how does the Fed supply the banking system with additional reserves in the first place?

In practice, the Fed can supply additional reserves to the banking system in two ways:

1. By making loans to banks (discount loans).
2. By purchasing US government securities (open market operations).

Let's examine how each of these methods works, with the help of some T-accounts.

2.1 Discount Loans

Suppose that Fleet Bank finds itself short of reserves, and asks the Fed for a \$100 discount loan.

When the Fed makes this discount loan, it credits Fleet's account at the Fed with an additional \$100.

And since we know that deposits at the Fed fall under the more general category of reserves, Fleet's T-account looks like this:

FLEET

Assets		Liabilities	
Reserves	+\$100	Borrowings	+\$100

The same items appear in the Fed's T-account, but in opposite columns:

FEDERAL RESERVE

Assets		Liabilities	
Discount Loans	+\$100	Reserves	+\$100

This example shows that the Fed can provide additional reserves to Fleet Bank, and hence to the banking system as a whole, by making discount loans.

2.2 Open Market Operations

Open market operation = The Fed’s buying or selling of US government securities in the regular (open) market.

In practice, open market operations are conducted at the “open market desk” at the Federal Reserve Bank of New York.

Suppose that the Fed decides to purchase \$100 in US Treasury bills and, at the same time, Fleet Bank decides to sell \$100 in US Treasury bills.

The Fed’s \$100 buy order is matched with Fleet’s \$100 sell order in the over-the-counter market for US government securities.

Hence, the Fed buys the \$100 Treasury bill from Fleet.

Fleet Bank gets a \$100 check from the Federal Reserve Bank of New York, which it deposits in its account at the Fed:

FLEET

Assets	Liabilities
Reserves +\$100	
Securities -\$100	

Meanwhile, the Fed has acquired a new asset—the \$100 Treasury bill—but has also issued a new liability—Fleet’s deposit at the Fed:

FEDERAL RESERVE

Assets	Liabilities
US Government Securities +\$100	Reserves +\$100

This example shows how the Fed can provide additional reserves to Fleet Bank, and hence to the banking system as a whole, by conducting open market operations.

3 Deposit Creation: The Single Bank

Now that we’ve seen how the Fed can supply additional reserves to the banking system, let’s go on to consider what happens at the specific bank that receives those additional reserves.

Following up on the last example, suppose that Fleet Bank has just sold \$100 in Treasury bills to the Fed:

FLEET

Assets	Liabilities
Reserves +\$100	
Securities -\$100	

Since Fleet has now increased its checkable deposits, its required reserves have not changed. Hence, the \$100 in new reserves are excess reserves.

Assuming that Fleet never wants to hold excess reserves, it may decide to make a new \$100 loan.

When Fleet makes that loan, it credits the borrower’s checking account with an additional \$100:

FLEET

Assets	Liabilities
Reserves +\$100	Checkable Deposits +\$100
Securities -\$100	
Loans +\$100	

But the story can’t end here since presumably Fleet’s borrower asked for the \$100 loan because he or she wanted to make some sort of purchase.

So suppose that the borrower runs a small business and uses the \$100 loan to purchase materials from a supplier.

To purchase those materials, the Fleet’s borrower writes a check to the supplier.

Assuming that the supplier never wants to hold currency, he or she will deposit the check in his or her account at Citibank instead of simply cashing the check.

Citibank then deposits the check in its account at the Fed.

The Fed transfers \$100 out of Fleet’s account and into Citibank’s account:

FLEET

Assets		Liabilities
Securities	-\$100	
Loans	+\$100	

CITIBANK

Assets		Liabilities
Reserves	+\$100	Checkable Deposits +\$100

But, once again, the story can't end here, because we need to ask about what Citibank will do with its new reserves.

4 Deposit Creation: The Banking System

By law, Citibank must hold $\$100 \times 10\%$, or \$10 as required reserves.

So Citibank now has $\$100 - \$10 = \$90$ in excess reserves.

Assuming that Citibank never wants to hold excess reserves, it may decide to make a new \$90 loan.

When Citibank makes this loan, it credits the borrower's checking account with an additional \$90:

CITIBANK

Assets		Liabilities
Reserves	+\$100	Checkable Deposits +\$190
Loans	+\$90	

But, once again, the Citibank's borrower presumably asked for the \$90 loan because he or she wanted to make some sort of purchase.

So suppose that Citibank's borrower writes a \$90 check to buy materials from a supplier.

Assuming that the supplier never wants to hold currency, he or she will then deposit the check in his or her account at the Bank of America instead of simply cashing the check.

The Bank of American then deposits the check in its account at the Fed.

The Fed transfers \$90 out of Citibank’s account and into the Bank of America’s account:

CITIBANK

Assets		Liabilities	
Reserves	+\$10	Checkable Deposits	+\$100
Loans	+\$90		

BANK OF AMERICA

Assets		Liabilities	
Reserves	+\$90	Checkable Deposits	+\$90

By law, the Bank of America must hold $90 \times 10\%$, or \$9 as required reserves.

So the Bank of America now has $90 - 9 = 81$ in excess reserves.

Assuming that the Bank of America never wants to hold excess reserves, it may decide to make a new \$81 loan.

And so the process continues:

The Bank of America’s borrower will write a \$81 check to buy materials from a supplier.

The supplier will deposit the check in his or her account at Wells Fargo.

Wells Fargo then deposits the check in its account at the Fed.

The Fed transfers \$81 from the Bank of America’s account to Wells Fargo’s account.

But now Wells Fargo has excess reserves, which it can lend out.

The final results are illustrated in Mishkin’s Table 1 (p.369):

Bank	Increase in Deposits (\$)	Increase in Loans (\$)	Increase in Reserves (\$)
Fleet	0	100	0
Citibank	100	90	10
Bank of America	90	81	9
Wells Fargo	81	72.90	8.10
JP Morgan Chase	72.90	65.61	7.29
...
Total	1000	1000	100

Conclusion: The \$100 increase in reserves leads to a \$1000 increase in deposits!

Note that

$$\frac{\$100 \text{ increase in reserves}}{\$1000 \text{ increase in deposits}} = \frac{\Delta R}{\Delta D} = 0.10 = 10\% = \text{required reserve ratio} = r.$$

This result is not a coincidence. It holds true in our example and it also holds true more generally:

$$\frac{\Delta R}{\Delta D} = r$$

or

$$\Delta D = \frac{1}{r} \times \Delta R.$$

Since r , the required reserve ratio, is a fraction, the number $1/r$ is greater than one.

Hence, this last formula tells us that when the Fed supplies the banking system with additional reserves, deposits increase by the multiple $1/r > 1$:

$$\text{Since } r < 1, \frac{1}{r} > 1.$$

$$\frac{1}{r} = \text{simple deposit multiplier.}$$

When the Fed supplies the banking system with an addition \$1 in reserves, deposits increase by the multiple $\$(1/r) > \1 .

And this process also works in reverse: when the Fed drains \$1 in reserves from the banking system, deposits decrease by the multiple $\$(1/r) > \1 .

5 Critique of the Simple Model

Our simple model assumes that:

1. Banks never hold excess reserves.
2. Individuals and non-bank corporations never hold currency.

Since neither of these assumptions is particularly realistic, we must modify and extend our model to take the behavior of banks and the non-bank public into account.

But before we pursue these extensions, it will be useful to consider a few more examples that show how the Fed controls the amount of reserves it supplies to the banking system and how the Fed controls the monetary base.